METHODS FOR ATTACHING SOLID HARDWOOD FLOOR PLANKS TO CONCRETE FLOOR SURFACES

This invention relates to methods for attaching solid plank hardwood floorboards on a concrete floor surface with no subflooring such as a wood or cork layer between the boards and the concrete floor surface. The invention also relates to floors comprising a concrete floor surface with solid plank hardwood floorboards with no wood layer between these boards and the concrete floor surface. The invention also relates to such floorboards including one or more of the following: surface-formed, man-made wormholes/nail holes/scratches; under side relief areas; varying thicknesses; and surface treatments such as tung oil treatments.

These methods comprise preparing, away from the site of installation, solid plank hardwood floorboards for attachment to a concrete floor surface. The preparation may comprise applying finishes to the plank hardwood floor boards to cause the boards to appear distressed, worn, worm-holed, nail-holed and/or scratched, as by color shading and/or character stamping the board surfaces; applying to concrete floor surfaces at least one elastomeric, water-resistant/ water impermeable adhesive, preferably a moisture-curing polyurethane-based composition comprising a prepolymer comprising polypropylene oxide polyols and toluene diisocyanate, together with alkyl sulfonic ester of phenol, vinyl chloride polymer, calcium carbonate and xylene; placing the prepared solid plank hardwood floor boards on the adhesive-coated concrete floor surface; nailing the solid plank hardwood floor boards to the concrete floor surface through the adhesive layer, preferably filling each nail hole with filler; allowing the adhesive to set; and treating the

solid plank hardwood floor board surfaces with surface finishes, sanding, or other desired finishing steps.

The solid plank hardwood floorboards are preferably made of hardwood or soft wood of various species e.g. maple, pine, oak, or walnut, and are preferably at least about 3 feet in length. In preferred embodiments, these boards have a thickness in the range of about one quarter (1/4) inch to about two (2) inches and a width in the range of about one quarter (1/4) inch to about twenty (20) inches. In preferred embodiments, the solid plank hardwood floor boards are milled to desired size specifications, including the desired lengths, then surface treated e.g. colored, sanded, etc. away from the installation site.

Some boards may be surface treated to appear distressed, worn, or color shaded, or some combination thereof, and may also be beveled at end and side edges to form rounded or slanted edge profiles. In addition, some boards include, at their edges, tongues or grooves to improve side-by-side fit. The boards may also include back relief, e.g. cutouts, to increase flexibility and to accommodate differences/irregularities in plank dimensions.

In some embodiments, the floorboards may be of varying thickness, and may be placed on a concrete floor surface with boards of greater thickness placed alongside boards of lesser thickness to produce a floor pattern, having slight variations of height from one board to the next. Preferably, these variations of height are up to about one eighth (1/8) inch. In preparation, the floorboards can also have character stamping applied including such features as nail holes, wormholes and scratches. The wormholes and scratches provide places to receive and hide nails or other fasteners.

The concrete floor surfaces to which the solid plank hardwood floor boards are attached should be prepared to be clean, dry, smooth, and substantially free of voids, projections and loose materials, oils, greases, sealers and other surface contaminants; to be low in surface moisture; and to be substantially flat, preferably no height variance larger than about 0.25 inch over a continuous run (e.g. over 10 feet, no inches) when measured with a level. Preferably, the moisture content of the concrete floor surface should not exceed about 5% by the Tremex Moisture Meter or 6 pounds by the calcium chloride test.

The solid plank hardwood floorboards, prepared away from the concrete floor surface installation site, can then be applied to the prepared concrete floor surface. To do so, an elastomeric, water resistant/impermeable adhesive is applied to the (preferably prepared) concrete floor surface. Preferably, this elastomeric water resistant adhesive is a moisture-curable polyurethane-based composition, or another adhesive that resists water permeation and that holds the boards firmly to the concrete surface, after the adhesive sets. The solid plank hardwood floorboards are then laid on the adhesive coated concrete repaired concrete floor surface. Any adhesive protruding through the floorboards is removed during the installation process.

To hold the floorboards to the adhesive-coated concrete floor surface while the adhesive is setting, the floorboards are preferably nailed to the concrete floor surface. The nails are preferably installed at a normal angle to the surface of the hardwood floorboards, and are driven through the floorboards and into the concrete floor surface through the adhesive layer. In preferred embodiments, the methods use an air nailer gun that delivers 15

gauge, preferably zinc hardened nails. Examples of such guns are the Grex USA 15 gauge, TS 23 air nailer gun. Examples of the nails are the Model FST 20 and 25, 15 gauge, T-profile, preferably zinc-hardened nails. In preferred embodiments, the nails are applied in a random pattern, most preferably 3 inches from each end of each floorboard, and preferably with no more than 3 or 4 nails per board. Random placement of nail holes followed by filling of nail holes, in preferred embodiments, provides a desirable, worm-holed surface appearance.

The floor surface can then be subjected to additional cleaning, finishing, sanding or polishing. In preferred embodiments, the surface of the floorboards is cleaned with mineral spirits so that dirt, grime, impurities and surface adhesive spots are removed. The surface of the floor can also be cleaned, e.g. with steel wool, and/or mineral spirits, and treated with washes such as a bleach, water bleed, alcohol bleed, chemically bonding colors and finishes.

After the adhesive has dried, the floor surface can be treated with a sealer, and/or with a color solution called a color bleed. After sealer and/or bleed coatings have dried, the floor surface can be sanded, and/or treated chemically, one or more times, as, for example, with wood bleach and chemically bonding colors and finishes as desired.

This invention also relates to floors comprising a concrete floor surface with solid plank hardwood floorboards adhesively attached to the concrete floor surface with no wood layer between these boards and the concrete floor surface. The board and concrete floor surfaces are those described above in this specification.

The methods and products of this invention will provide several advantages. First, because the solid floor board planks are prepared for application to a concrete floor surface away from the installation site, the time required and the costs incurred to install the floor board planks at the installation site is reduced and the time of installation is smaller than the time required where the wood is placed at the site in raw condition, and then finished/treated at this site. Second, the elimination of subflooring, and the cost of installing subflooring, also provide substantial cost savings.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention can better be understood by reference to the drawing in which:

Fig. 1 is a perspective view of a floor embodiment of this invention; and

Fig. 2 is a side elevation view of the floor embodiment of Fig. 1.

DETAILED DESCRIPTION OF THE DRAWINGS

Figs. 1 and 2 show floor 10 made in accordance with the methods of this invention. Floor 10 includes concrete slab 1 with solid plank hardwood floorboards 2, 3, 4, 5 and others adhesively attached thereto by adhesive layer 12. Planks 2, 3, 4 and 5 include cutouts and other relief features 14 and 15 on their bottom surfaces. On their top surfaces, wormholes/nail holes/scratches 6, 7, 8 and 9 form sites to receive and hide nails or other fasteners. These nails pass through floorboards 2, 3, 4 and 5,